

VERIFICATION OF TRANSLATION

I, Michaela Komine, translator of 1-817 Amaike-cho, Mibu, Nakagyo-ku, Kyoto-shi, Japan, hereby declare that I am conversant with the English and Japanese languages and am a competent translator thereof. I further declare that to the best of my knowledge and belief the following is a true and correct translation made by me of Japanese Unexamined Utility Model Publication No. 59-140560 filed on March 9, 1983.

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JAPANESE UNEXAMINED UTILITY MODEL APPLICATION PUBLICATION NO.

59-140560

TITLE: TRANSMISSION/RECEPTION APPARATUS

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Description

10 1. Title of Device

TRANSMISSION/RECEPTION APPARATUS

2. Claim

15 A transmission/reception apparatus composed of a phase
shifter that connects to an input/output terminal, a first
transmission/reception switcher that connects to the phase
shifter, a transmission amplifier and a reception amplifier
provided between the first transmission/reception switcher and
a second transmission/reception switcher, and a opening unit
20 that connects to the second transmission/reception switcher,
wherein the transmission/reception apparatus has a structure
in which part of the reception amplifier and part of the
transmission amplifier are a transmission/reception common
amplifier.

3. Detailed Description of the Device

This device relates to an improvement in a transmission/reception apparatus that is used as an antenna
5 device in a phase array radar, and has an internal reception amplifier and transmission amplifier.

An example of the structure of a conventional transmission/reception apparatus is shown in FIG. 1.

In FIG. 1, (1) is an input/output terminal, (2) is a phase
10 shifter, (3a) and (3b) are transmission/reception switchers, (4) is a transmission amplifier, (5) is an opening unit, (6) is a single pole double throw switch, (7) is a terminal, and (8) is a reception amplifier.

Operations of the transmission/reception apparatus are
15 described in accordance with FIG. 1. A transmission signal input into the input/output terminal (1) is, after being phase controlled in the phase shifter (2), input into the transmission amplifier (4) by the first transmission/reception switcher (3a). The transmission signal amplified in the amplifier (4) passes
20 through the second transmission/reception switcher (3b) which is composed of a circulator, and is emitted from the opening unit (5).

On the other hand, a reception signal input from the opening unit (5) passes through the transmission/reception

switcher (3b) and the single pole double throw switch (6), and is input into the reception amplifier (8). The reception signal amplified in the amplifier (8) is, after being input into and phase controlled in the phase shifter (2), output from the input/output terminal (1).

Note that since there is a risk that the transmission amplifier (4) and the reception amplifier (8) will be damaged by part of transmission power reflected from the opening unit (5) during transmission, the terminator (7) absorbs power that passes through the transmission/reception switcher (3b) and the single pole double throw switch (6) and is emitted, and protects the transmission amplifier (4) and the reception amplifier (8).

The transmission amplifier (4) used in a transmission/reception apparatus having such a structure is for amplifying minute incident power to output several Ws, and a transistor amplifier having several stages is used in the structure. On the other hand, the reception amplifier (8) is also, in the same way as the transmission amplifier (4), structured from a transistor amplifier having several stages in order to low noise amplify and to obtain required gain.

However, the device is structured such that the transistor amplifiers of several of the earlier stages of the transmission amplifier (4), excluding the high output amplifier stage, and the transistor amplifiers of the latter stages of the reception

amplifier (8), excluding the earlier stage low noise amplifying stage, use the same transistor amplifiers. For this reason, in a transmission/reception apparatus in which compactness and lightness are demanded, not only does the number of components increase, going against compactness and lightness, but there is are also disadvantages such as the number of contact points increasing and the failure rate increasing.

The present device is for eliminating such disadvantages, and the structure of the transmission/reception apparatus of the present device is shown in FIG. 2. (9) is an amplifier and (10) is, as a whole, a reversible amplifier.

The transmission/reception apparatus of the present device uses the amplifier (9) commonly as the earlier stage-side amplifier of the transmission amplifier (4a) and the latter state-side amplifier reception amplifier, and single pole double throw switches (6b) and (6c) are provided respectively at the input side and the output side of this amplifier (9). The amplifier (9) and the single pole double throw switches (6b) and (6c) together make up are, as a whole, the reversible amplifier (10).

The following describes operations of the reversible amplifier (10) of the present transmission/reception apparatus. At the time of transmission, the terminals (31) and (32) of the transmission/reception switcher (3a) are connected, the

terminals (62) and (61) of the single pole double throw switch are connected, and the terminals (64) and (65) of the single pole double throw switch (6c) are connected. As a result of being connected in this way, the transmission signal incident to the transmission/reception switcher (3a) via the phase shifter (2) is output to the terminal (61) of the single pole double throw switch (6b) via the input (32), and becomes the input signal of the amplifier (9). The signal amplified in the amplifier (9) is input into the transmission amplifier (4a) via the terminal (65) of the single pole double throw switch (6c), and is output from the opening unit (5) as shown in the operations shown above, as a transmission signal. On the other hand, at the time of transmission, the terminals (63) and (61) of the single pole double throw switch (6b) are connected, the terminals (64) and (66) of the single pole double throw switch (6c) are connected, and the terminals (33) and (31) of the transmission switcher (3a) are connected. As a result, the reception signal that is low noise amplified by the reception amplifier (8a) is input into the amplifier (9) via the terminals (63) and (61) of the single pole double throw switch (6b). The transmission/reception apparatus is structured such that the signal amplified by this amplifier (9) is input into the transmission/reception switcher (3a) via the terminals (64) and (66) of the single pole double throw switch (6b), and input into

the phase shifter (2) via the terminals (33) and (31) of the transmission/reception switcher (3a).

FIG. 3 shows another implementation of the present device. Here, as an example of the reversible amplifier (10), a reflection amplifier having two properties is connected to two coupling terminals of a 3dB directional coupler, and the other two terminals of the 3dB directional coupler are input/output terminals respectively. The device can be structured so as to have an amplifier used commonly for transmission and reception, in the same way as the described amplifier (9).

Since the transmission/reception apparatus of the present device having such a structure is able to amplify transmission and reception signals with one amplifier (9), it has a merit of being able to significantly reduce the number of components, and that the transmission/reception apparatus can be structured so as to be light in weight and, due to a low failure rate, highly reliable.

4. Brief Description of the Drawings

FIG. 1 is a structural diagram of a conventional transmission/reception apparatus, and FIG. 2 and FIG. 3 are structural diagrams of transmission/reception apparatuses of the present device.

Shown in the drawings, (1) is an input/output terminal,

(2) is a phase shifter, (3) is a transmission/reception switcher, (4) is a transmission amplifier, (5) is an opening unit, (6) is a single pole double throw switch, (7) is a terminus, (8) is a reception amplifier, (9) is an amplifier, and (10) is, as a whole, a reversible amplifier.

Note that same or corresponding parts of the drawings have the same numbering.

FIG. 1

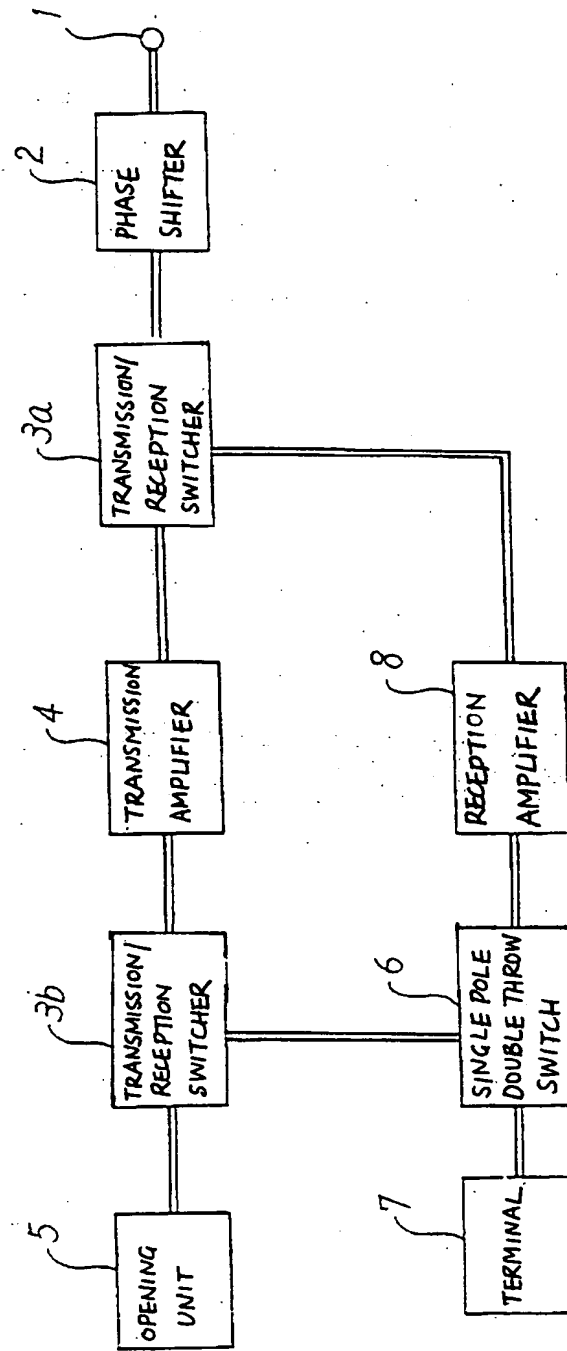


FIG. 2

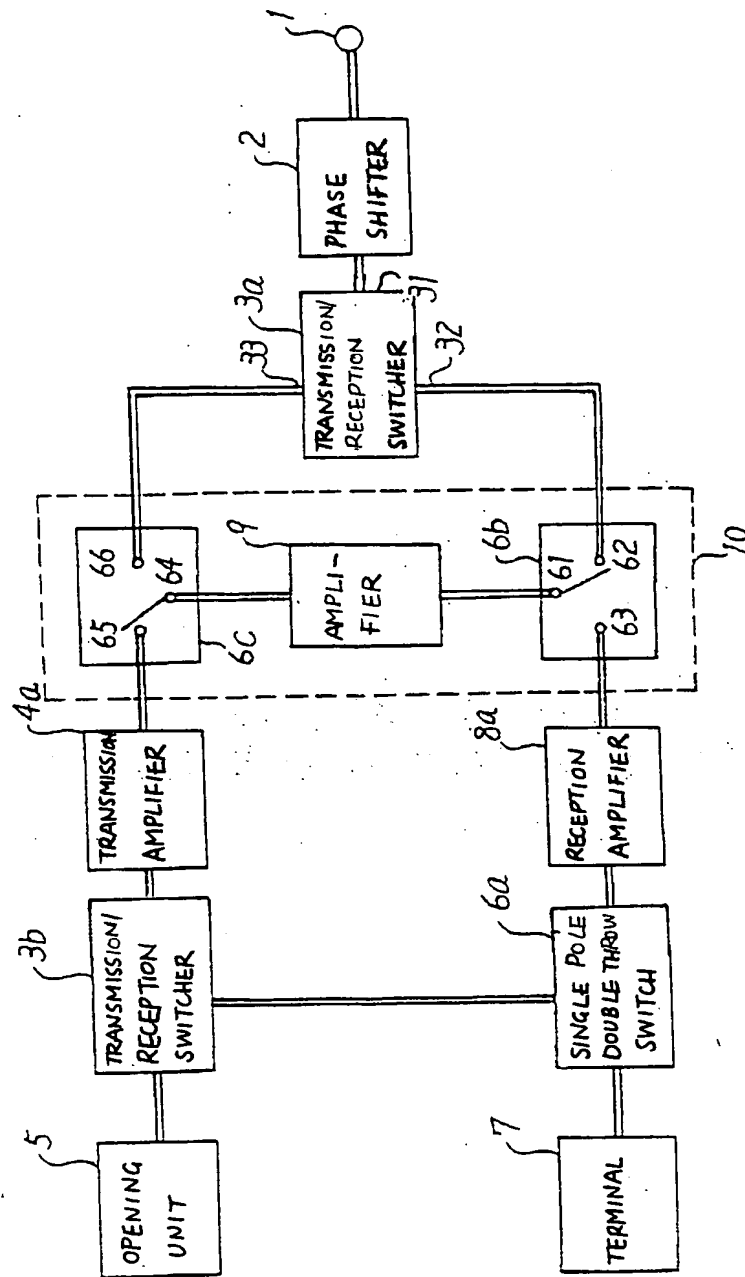


FIG. 3

